

A 1968 PROGRESS REPORT ON  
LISTENING RESEARCH AT APH

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MAR 21 1972

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## A 1968 PROGRESS REPORT ON LISTENING RESEARCH AT APH

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### Introduction:

At the Salt Lake City meeting, a first report of our long term research program on the use of recordings in the education of the blind was presented. In this project, it is our plan to compare the relative effectiveness of listening and reading as media for education, to identify efficient techniques for use in study through listening, and to develop equipment and recordings especially designed for this purpose.

You may recall the report given in 1966 by Miss June Morris describing the outcome of our studies of the relative efficiency of reading and listening in study. These studies were conducted at both the elementary and high school levels and involved the curricular areas of literature, social studies, and science. Their results strongly supported the conclusion that while there were few absolute differences between amounts of learning resulting from reading or listening, in terms of time spent, listening appeared the more efficient medium. The possibility that this might not always be the case (for example, for very difficult or highly technical material) was noted.



### Other Early Research:

We did not report at the Salt Lake City meeting on other listening research we had completed. One such study was based on analysis of intensive interviews of students who customarily used recordings in study. Since some of the results of this research provided the background for the research to be reported today as well as research currently underway, it might be well to summarize these.

The most immediate impression given by the interview results was that many incompatibilities exist among the playback equipment, recording formats, writing equipment, and the techniques students utilize. For example, it requires two hands to operate a brailler in note taking leaving no hands available to operate playback equipment as it is currently designed. This makes it appear that use of recorded texts, as described by these students, is no more than a makeshift expedient. For it to become any more than this would require development of a system of playback equipment, recording formats, and user techniques specifically oriented to the task of study. The interview material provides partial information needed to describe this task. However, additional data are needed.

Some of the specifications for adequate playback



equipment can be inferred from students' comments. A primary need seems to be for control systems which can be knee or foot operated. Disc equipment should have both forward and backward movement allowing for easier place finding and repeated listening. A wide range of speeds (perhaps continuously variable) should be available to help in scanning and place finding.

Possibilities for development of recording formats can also be inferred. Techniques are needed for making page numbers and other entry information stand out from the text so as to be obvious for search purposes. This material should be presented at much faster speeds than the text material to facilitate search. Textbooks should have braille or large type supplements for tables of contents, indexes, glossaries, and certain graphics.

Techniques for use of recorded text materials should be described and students instructed in these. For many students the listening experience appeared to be passive to the extent that little learning seemed possible. The student should actively engage the material. Note taking is one means of doing this. Although it appears that recorded note taking techniques may be most efficient, almost no use of these was reported. It seems that many of the



techniques suggested by learning theory and described for use in study by reading would be applicable also for listening. This information should be available to blind students. The fact that students reporting active techniques (note taking) proved to be better listeners supports these conclusions.

It was the latter conclusions, stressing the importance of active engagement of the student in the listening study process that stimulated the research to be reported here. The purpose of this research was to compare learning achieved through active and passive listening.

#### Research on Active Participation in Listening:

During the course of our previous research on listening, we have been concerned continuously with the problem of attention. Postures assumed by subjects during listening (ranging from upright business-like attitudes to dradling the head in the arms on the desks) suggested a variety of degrees of attentiveness. In our interviews, attentive postures were mentioned as critical to good listening and the necessity for activity during listening was emphasized. Such activity could be peripheral to listening activity, i.e. knitting, or could constitute active involvement in the listening learning process as in taking notes.

These comments of students on the necessity for activity



are supported by evidence long existing in psychological literature. A favorite example of the effects of peripheral activity on learning is the experiment of Bells and Stauffacher (1937) where subjects who memorized material while squeezing the handgrips of dynamometers learned more than subjects who did not engage in this activity. Another example is an early study by Gates (1917) which showed that recitation while learning facilitated the learning of lists of nonsense syllables and short biographies.

Consequently, it appeared important to confirm empirically the effects of active participation on learning through listening. At the same time, it appeared of interest to compare learning at normal listening rates with learning at compressed rates under conditions of active and passive involvement. Foulke and Sticht (1966, p. 27) suggest that comprehension of compressed speech deteriorates at increasing rates of compression because the rate of information input exceeds the information handling capacity of the auditory channel. If this is the case, interruption of the message for recitation could result in greater facilitation of comprehension for compressed materials than for those presented at normal rates of speech.

Since earlier research (McClendon, P. I., 1956) had indicated that note taking during lectures had little or no effect on listening comprehension, it was decided that



active participation should take the form of repetition of material.

Procedure:

Six similar studies were designed to compare learning achieved under active and passive conditions of listening for material presented at normal and moderately compressed rates. Studies involving three curricular areas were conducted at both the elementary and high school levels.

Subjects in each of the six studies were equally divided among three modes of listening: (1) continuous listening, (2) listening interrupted at four intervals for 45-second periods during which time subjects were to mentally review what they had just heard, and (3) listening interrupted at four intervals for four-minute periods during which time subjects were to make written notes on what they had just heard. In addition, subjects within each listening mode were equally divided into two groups which listened to the material presented at two different word rates. Immediately following listening, all subjects were tested for comprehension.

A special feature of these studies was the technique used to assure high levels of motivation. At each research site, participants were told they had been divided into equal groups that were to participate in a "listening contest" and that each member of the group achieving the highest



average score would receive a prize as a reward. The prize was a box of candy, but subjects were not apprised of what it would be. Elementary groups competed only with other elementary groups and groups from the upper grades only with others from their level.

#### Materials:

The materials used to study listening techniques were taped recordings of the same six selections as were used in the listening research reported earlier in which efficiency of learning by listening was compared with that of learning by reading. The selections included material at two levels of difficulty for three subject areas: literature, science, and social studies. One level of difficulty was appropriate in language and content for students in the elementary grades and the other for students in the upper grades.

For the present studies, the selections were reproduced at two word rates; one being the normal uncompressed rate of approximately 175 words per minute (wpm) and the other being compressed to approximately 225 wpm. The Tempo Regulator, as modified and used by the American Printing House for the Blind, was the device used for compression.

Braille multiple choice tests were used to measure comprehension. Subjects were given as much time as feasible to complete their tests. Scores were prorated for those not finishing if they had attempted to answer 85% or more of the questions.



Braillewriters and/or slates and styli were provided for those subjects required to write. Subjects were permitted to use either the one to which they were most accustomed or the one they preferred.

#### Subjects:

All subjects taking part in the study of listening techniques were legally blind students enrolled in regular classes at 15 residential schools for the blind. Each customarily read and wrote braille. A total of 720 participated: 240 in the literature part, 240 in the science part, and 240 in the social studies part. One hundred twenty of each were selected from grades 4-7 (60 from grades 4 and 5 and 60 from grades 6 and 7) and 120 from grades 8-12.

Two levels of elementary subjects were used as previous research had uncovered significant grade level differences within groups using the same material. Each elementary treatment group consisted of 10 subjects from grades 4 and 5 and 10 from grades 6 and 7. As earlier work had found no grade level differences between students in upper grades, these subjects were selected without regard to grade.

#### Results:

First, let's consider the question of whether more active participation in the listening process increases comprehension. The answer is a qualified - yes, it does.



At the elementary level, this effect occurs only for the material which was compressed to 225 wpm and occurs for all curricular areas. Generally, the note taking form of repetition produced superior comprehension.

At the high school level, from the overall standpoint, note taking again produced comprehension superior to that for the other modes of listening. However, the extent of this result varied with the type of material. The effects were very strong for literature and social studies. They were less obvious for science. For literature, the mental review type of repetition was as effective as note taking.

Let's next consider the question of differences between comprehension for materials presented at regular and compressed rates. As we have seen, at the elementary level, active participation in listening resulted in improvement of comprehension for compressed materials only. At the high school level, however, the effects of active participation in the listening process were similar for materials presented at regular and compressed rates.

One peripheral finding was quite unexpected and surprising. In five out of six possible occurrences, students comprehended materials presented at regular rates (175 wpm) considerably better than those presented at compressed rates (225 wpm). This is in contrast with all other research, where speech rates were increased to 250-275 wpm before difference in comprehension



between these and normal word rates occurred. The only apparent difference between our studies and those conducted earlier appear to be motivational. In the present studies a high degree of motivation was achieved through the "contest" approach. These findings imply that, under conditions of high motivation, the advantages attributed to use of compressed speech may be suppressed and that regular rates of speech may be more effective in educational communication.

#### Research Planned for the Future:

Now, just a word about future activities. During the forthcoming year, we plan to pursue two goals of our project: (1) Continue comparing the relative efficiency of reading and listening as means of learning and (2) develop equipment and recordings especially designed for use in study.

One project now being initiated will compare reading and listening comprehension for blind students in low ranges of mental ability. In earlier studies of braille reading by such students, we found that those within the IQ range of 65-85 read slowly; at about 50 wpm. The job of learning to read braille is extremely difficult for this group and, because of the poor techniques evolved, comprehension is poor. In effect, braille reading for this group may comprise an additional educational handicap. Consequently, listening may be a superior medium for education of these students. This is a question that will be investigated this year.



Another project is stimulated by a finding of our user interviews which was summarized earlier. This was the finding that the design of the recording equipment and materials used by students in study appeared to be based on recreational instead of educational requirements. In view of this we plan to attempt to develop a system of recording equipment and materials specifically designed around study requirements.

Development of two study systems is eventually envisioned; one using magnetic tape input and one using pressed disc input. Initial emphasis in this project will be on the pressed disc system since capability currently exists for high volume production of recordings in this form. Specifications for the system will be derived from a task analysis of the study job. Since this is not complete at the time of this writing, complete specifications for the system are not available. However, on the basis of the informal analysis made to date, directions of development can be indicated.

The current Talking Book Reproducer will be modified in a variety of ways. The turntable will be made to run both backward and forward. Forward movement, at least, will be continuously variable over a wide range of speeds. Controls for start-stop, forward-reverse, and turntable speed will be designed for foot or knee activation.

Recorded textbook formats will be modified and supplemented by braille and large type materials such as indexes.



Recording methods will be developed using stereophonic techniques which will allow two sound tracks to be recorded in a single groove on the disc. One sound track will contain the text and the second sound track the page numbers and index information. The user will be able to switch tracks at will. Differentials in speeds of recording tracks one and two will provide for slow text playing speeds on track one and rapid search on track two. A desirable part of this development will be exploration of recording at four revolutions per minute.

Response equipment in the system will be either a braille-writer or a large type typewriter. Use of a tape recorder in the response system will be explored.

An instruction manual will be written for the system describing its use and emphasizing techniques for study based on learning theory.

This, then, is our progress in listening research to the present. We hope to be able to report further progress to you in 1970.

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